Small Business Innovation Research/Small Business Tech Transfer

Low Cost Personal Life Support System, Phase I

Completed Technology Project (2018 - 2019)

Project Introduction

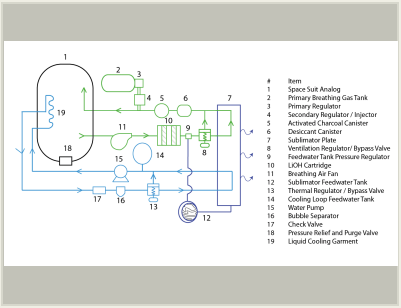
Final Frontier Design (FFD) proposes a Low Cost Personal Life Support System (PLSS) for a space suit, utilizing commercial, off-the-shelf (COTS) items wherever possible. The closed loop, Low Cost PLSS system proposed includes all the required systems for a generic EVA setup, and can be packaged effectively for outer space based applications. The use of COTS items with a minimum amount of original parts greatly reduces unit and development costs while maintaining a safe and effective means of life support. The Low Cost PLSS can be designed for "minimal use", such that it is utilized in space and discarded on re-entry, rather than returned for maintenance and servicing, which represents a major design and operational cost barrier for current systems. The Low Cost PLSS is designed and intended to be able to be used with current space suit enclosure systems.

The Low Cost PLSS is broken into three major systems as described above: the Ventilation System, the Thermal Control System, and the Electronics and Controls System. FFD has identified multiple COTS, ISO certified suppliers for most components required for the system; the components have been chosen for prior space applications or space-like environment use. The Low Cost PLSS can greatly reduce unit price for the PLSS, with parts alone costing less than $120,000, likely an order of magnitude less expensive than the current next generation PLSS system.

Anticipated Benefits

NASA's future exploration missions can benefit from an economic solution to the PLSS that is focused on single use capabilities appropriate for individual missions. A Low Cost PLSS could reduce mission costs while increasing units of replaceable backpacks for the space suit enclosure. "Low-cost customization" is, as mentioned in the SBIR calls, "is vital to NASA's future exploration capabilities in many ways." An interchangeable PLSS system can potentially adapt to new technologies.

There are now more than a handful of commercial space companies with billions of dollars dedicated to human spaceflight, both to orbital, microgravity destinations, as well as to planetary surface operations. At least 8 American companies intend to send humans to operate in the space environment. Each of these companies will require EVA operations to maintain, upgrade, and save their space based assets. However, there currently does not exist a commercial, cost-driven EVA system solution.



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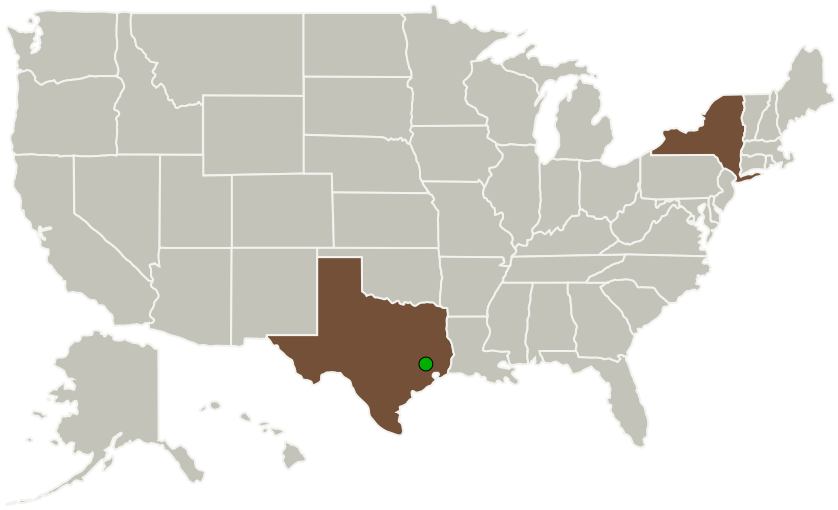
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Final Frontier Design	Lead Organization	Industry	Brooklyn, New York
Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations	
New York	Texas

Project Transitions

July 2018: Project Start

February 2019: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/137852)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Final Frontier Design

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

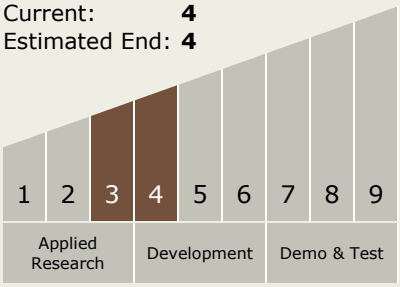
Carlos Torrez

Principal Investigator:

Theodore C Southern

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



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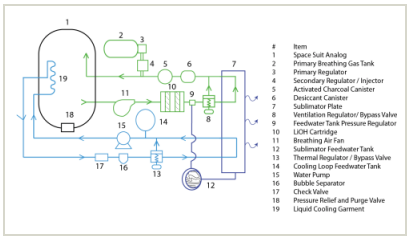
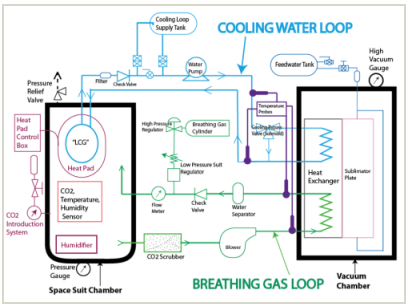
Images



Briefing Chart Image
Low Cost Personal Life Support System, Phase I
(https://techport.nasa.gov/image/129825)



Final Summary Chart Image
Low Cost Personal Life Support System, Phase I
(https://techport.nasa.gov/image/127606)

Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.2 Extravehicular Activity Systems
    - TX06.2.2 Portable Life Support System

Target Destinations

Earth, The Moon, Mars